

Harvey S. John.

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## THE STANDARD-SPECIES OF NYMPHAEA L.

T. A. SPRAGUE.

THE appearance of Mr. Kenneth K. Mackenzie's paper on the "Proper Use of the Name *Nymphaea*" (RHODORA, Nov. 1927, xxix. 234) raises once more a question which seemed to have been finally laid to rest by Conard (RHODORA, July 1916, xviii. 161), namely the correct application of the name *Nymphaea* L. Mr. Mackenzie's case for the application of *Nymphaea* to the yellow waterlilies depends on the acceptance of two points: (1) that Linné in 1753 had a type-species of *Nymphaea* in mind: (2) that it was *Nymphaea lutea* L.

(1) The *type-concept* of genera (and other groups) is now so familiar that its adherents sometimes do not realize or else have forgotten that another concept is not only possible, but was actually held by various eminent botanists during a great part of the eighteenth and nineteenth centuries. This alternative concept of genera, which may be termed the *diagnosis-concept*, is that a genus includes (and the generic name is equally applicable to) all those species that agree with the generic description. No idea of a type-species entered the diagnosis-concept, though species which agreed in all but one or a few of the generic characters might be appended provisionally to the genus as "aberrant" elements. If they were definitely included, however, the generic diagnosis had to be amended.

Acceptance of the diagnosis-concept, combined with inadequacy of the original diagnosis, led in many cases to the transference of a generic name from one group to another which contained none of the original species. This was possible because the sole criterion



for inclusion in the genus was agreement with the description. Thus the names *Epidendrum* L. and *Satyrium* L. came to be applied to (and are still widely used for) genera containing none of the species originally included under them by Linné. Such transferences would not have occurred had those botanists who introduced or first accepted them held the type-concept of genera. The cases of *Banisteria* L. and *Gesneria* L. are similar. The principle governing the application of the generic name in the event of segregation was apparently that it should be applied to the group containing (at the time of segregation) the largest number of species.

It is clear that many of Linné's successors did not hold the type-concept of genera. What evidence is there that Linné himself held it? I know of none.

(2) Mr. Mackenzie states that Linné took up Boerhaave's view that the yellow waterlily was typical of the genus *Nymphaea*, apparently<sup>1</sup> basing this conclusion on the fact that Linné (Gen. Pl. ed. 1, 149) cited Boerhaave, and gave the three elements of the genus in the following order: (1) *Nymphaea* Boerh. (*N. lutea*), (2) *Leuconymphaea* Boerh. (*N. alba*), (3) *Nelumbo* Tourn. (*N. Nelumbo*); and in the generic description mentioned the characters of *N. lutea* before the corresponding ones of *N. alba*. In other words Mr. Mackenzie thinks that "priority of place" indicated the Linnean type. I suggest that Linné adopted Boerhaave's sequence as the line of least resistance. Unless he had any special reason to change it, it was obviously less trouble to retain the same sequence.

In this connection it is pertinent to enquire in what order Linné cited the constituent elements of other genera. The first similar case in Gen. Pl. ed. 5 is *Verbena* (p. 12), under which he mentioned the generic components in the following order (1) *Sherardia* V.; (2) *Blairia* H.; (3) *Verbena* V.; (4) *Kempferia* H. The modern equivalents are (1) *Lippia*, *Stachytarpheta*, etc.; (2) *Priva*; (3) *Verbena*; (4) *Tamonea*. There can be no question that if Linné regarded any of the elements of his *Verbena* as typical it was *Verbena* V., which included *V. officinalis* L., the generic type according to modern ideas. Yet *Verbena* V. was only third in order. A possible explanation of this is as follows: the genus included both diandrous and tetrandrous components, and as it was placed in *Diandria*, the groups *Sherardia* and *Blairia* (diandrous) would naturally precede *Verbena* (tetran-

<sup>1</sup>Mr. Mackenzie writes that his argument was not based on priority of position: see postscript.

drous). *Kempferia* (diandrous) may have been placed at the end because it was aberrant as regards its calyx.

The next case in order is *Iris* (Gen. Pl. ed. 5, p. 24) in which the generic constituents are (1) *Xiphium* T.; (2) *Sisyrinchium* T.; (3) *Hermodactylus* T.; (4) *Iris* T. Here the arrangement was based on the morphology of the underground parts: bulb, double bulb, tuberous "root," fleshy creeping "root," respectively; *Iris* T., which includes *I. Pseudacorus*, now regarded as the type-species, came last.

In the case of *Rhus* (p. 129), the order of the constituents is (1) *Rhus* T.; (2) *Toxicodendron*; (3) *Vernix*; the element now recognized as typical coming first in this instance.

Linné (p. 160) united *Alisma* Dill. and *Damasonium* Tourn. under the former name, but mentioned the characters of these genera in the order (1) *Damasonium*; (2) *Alisma*.

The above examples show conclusively that *priority of mention* by Linné of a generic component may be of no value in determining what component, if any, he had chiefly in mind.

Linné's disregard of "priority of position" may be further illustrated by his treatment of species and varieties. In Sp. Pl. ed. 1, 7 he united *Phillyrea folio ligustri* C. Bauh. and *P. angustifolia* (*prima et secunda*) C. Bauh. under the name *P. angustifolia*, making *P. folio ligustri* his var.  $\alpha$  (without the symbol), and *P. angustifolia* C. Bauh. his var.  $\beta$ , although according to modern ideas the latter is the "historic type" of *P. angustifolia* L. But in Sp. Pl. ed. 2, 10, where Linné recognized the two varieties as independent species, he retained the name *P. angustifolia* L. for his var.  $\beta$ , and proposed a new name, *P. media* L., for his var.  $\alpha$ . Clearly in this case the var.  $\beta$  was—to say the least—just as representative of *P. angustifolia* L. (1753) as the var.  $\alpha$ . Why did Linné place *P. folio ligustri* C. B. before *P. angustifolia* C. B.?—apparently because it was the line of least resistance to accept Bauhin's sequence.

The case of *Mesembryanthemum scabrum* L. Sp. Pl. ed. 1, 483, points in the same direction. Linné united *M. purpureum scabrum staminibus expansis* Dill. and *M. purpureum scabrum, staminibus collectis* Dill., as varieties  $\alpha$  (without symbol) and  $\beta$  respectively, under the name *M. scabrum*. In Sp. Pl. ed. 2, 692, however, where he recognized the two Dillenian plants as distinct species, he retained the name *M. scabrum* for his var.  $\beta$ . Reference to Dill. Hort. Eltham. 259, 260, shows that Linné, when he (Hort. Cliff. 219) originally



united the two Dillenian species, retained the sequence in which they had been given by Dillenius, again following the line of least resistance.

The example of *M. tortuosum* L. Sp. Pl. ed. 1, 487, is similar, the binary combination being again retained for the var.  $\beta$ . When Linné (Hort. Cliff. 217) originally united the two Dillenian species, however, he reversed the sequence, without any apparent reason, but possibly in order that the variety having the greater number of references should come first.

In the case of *M. loreum* L. Sp. Pl. ed. 1, 486, where Linné—perhaps for the same reason—also departed from the Dillenian sequence, he retained the specific name on segregation for his var.  $\gamma$ , to which it had originally been applied by Dillenius.

Similarly when in 1764 (Sp. Pl. ed. 2, 731, 732) he divided *Ochna Jabotapita* (Sp. Pl. ed. 1, 513) into two species, he retained the name for var.  $\gamma$ , with which *Jabotapita* was originally associated as a vernacular name; and when he divided *Geranium triste* (Sp. Pl. ed. 1, 676) into two species, *G. lobatum* and *G. triste* (Sp. Pl. ed. 2, 950) he reserved the name *triste* for his varieties  $\beta$  and  $\gamma$ , the former being the original *Geranium triste* of Cornuti. These various examples demonstrate that the sequence of varieties in the Species Plantarum, ed. 1, does not necessarily indicate which element, if any, Linné regarded as most representative of the species in question.

To apply "priority of place" in retrospectively typifying a Linnean species, is equivalent to ascribing to Linné in 1753 nomenclatural views held at the present day by a particular body of botanists in the United States.

In the cases of *Phillyrea angustifolia*, *Mesembryanthemum loreum*, *Ochna Jabotapita* and *Geranium triste*, when Linné, in Sp. Pl. ed. 2, separated two or more groups which he had previously united under the name of one of them, he retained that name for the group to which it was originally given. How does this principle apply in the case of *Nymphaea*? Linné united *Nymphaea* Tourn. and *Nelumbo* Tourn. under the former name: hence *Nymphaea* Tourn. was presumably the "typical" section. But what was its "typical" element? Tournefort gives no indication. The earliest references cited in L. Sp. Pl. ed. 1, 510, 511, are to *Nymphaea lutea major* C. Bauh. Pinax, 193, and to *N. alba major* C. Bauh. l. c. Caspar Bauhin divided *Nymphaea* into two sections to which he gave the binary names *Nymphaea alba* and *Nymphaea luteo*; but he did not indicate either section as being more representative. The earliest references cited by Bauhin are

to *Nenuphar album* Brunf. and *Nenuphar luteum* Brunf. Brunfels (Herb. i. 38, 40) did not indicate either of these as more representative of *Nymphaea* than the other. Thus from the time of Brunfels to that of Tournefort there is no indication of a "type" of *Nymphaea*.

The previous history of the name *Nymphaea* is immaterial for the following reason: just as nowadays the starting-point for nomenclature is 1753, so for Linné the starting-point both for taxonomy and nomenclature seems to have been Brunfels' *Herbarum Vivae Eicones* (1530). It may be mentioned, however, that the earliest application of the Greek word *νυμφαία* was to the yellow waterlily, for which it was used by Theophrastus (*Enquiry into Plants*, ed. Hort, ii. 466); and that, on the other hand, Dioscorides, who included both kinds of waterlily under *Nymphaea*, called the white kind *Nymphaea*, and the yellow kind *Nymphaea altera*, thus apparently regarding the former as more representative (Dioscorides, *Mat. Med.*, ed. Sprengel, i. 478).

During the period 1530–1720 A.D. the yellow and white waterlilies were regarded as belonging to the same genus. As Mr. Mackenzie points out, Boerhaave (*Ind. alt. Pl. Hort. Acad. Lugd.-Bat.* i. 281: 1720) restricted *Nymphaea* to the yellow water-lilies, and proposed the new name *Leuconymphaea* for the white. In *Syst. Nat.* ed. 1 (1735) Linné cited *Leuconymphaea* as a synonym of *Nymphaea*, and in *Gen. Pl.* ed. 1, (1737) he included *Nelumbo* in the genus.

I do not find any evidence that during the period 1735–1754 Linné considered the question of which was the most typical element of *Nymphaea* Tourn. He not only rejected Boerhaave's division of that genus, but went still further by uniting *Nelumbo* Tourn. with it. Hence the question of the type of *Nymphaea* Tourn. did not arise.

Examination of the description of *Nymphaea* in *Gen. Pl.* ed. 5, shows that it covered both *N. lutea* and *N. alba*, the words "perianthium pentaphyllum" and "petala calyce minora" referring to the former, while "perianthium tetraphyllum" and "petala germinis lateri insidentia" refer to the latter. Surely the conclusion to be drawn is that Linné in 1754 considered the yellow and white waterlilies equally typical of *Nymphaea*. By 1764, however, his conception of the genus had changed, and the white waterlilies were definitely indicated in the description in *Gen. Pl.* ed. 6, 264, as the typical element.



I do not for a moment suppose that all adherents of the American Code will be convinced by my facts and arguments, for that would imply abandonment on their part of the principle of "priority of place." The object of my reply is to demonstrate that, starting from the same basis of facts, a very different view as to the type (or absence of type) of *Nymphaea* (1753-54) may be taken, according to the methods adopted in retrospective typification. Until there is general agreement among botanists as to these methods there will necessarily be differences of opinion as to the "type-species" of many of the Linnean genera. And even where botanists follow the same methods they may reach different conclusions: thus in 1922-23 I regarded *Bignonia capreolata* L. as the type-species of *Bignonia* L. whereas Dr. S. F. Blake regarded *B. radicans* L. as the type (*vide* Journ. Bot. 1922, 236, 363; 1923, 191). Here the different results arose from different identifications of certain of Tournefort's figures. Reviewing the case of *Bignonia* L. (1753) in the light of that of *Nymphaea*, I now consider that Linné in 1753 had no particular species of *Bignonia* more in mind than the others. A similar conclusion might be reached in many other cases of Linnean genera. It follows that the only method of securing uniformity in the application of Linnean generic names is the acceptance by an International Congress of a list of Standard-species (*vide* Kew Bull. 1926, 96). In the case of *Nymphaea*, a suitable standard-species would be *N. alba* L., as that would ensure the retention of the generic name *Nymphaea* as generally applied.

ROYAL BOTANIC GARDENS, Kew.

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*Postscript.* Since the above was written, Mr. Mackenzie, to whom I had sent a copy, has informed me that his "argument about the proper use of *Nymphaea* was not based on priority of position, but was based on the division of the genus into sections by Linnaeus 1737-1753, and his change of generic description in 1764, when he first treated the yellow water lily as differing from the others." In that case, I fail to see that there is any evidence left in support of Mr. Mackenzie's contention. Linné in 1737 did not divide *Nymphaea* into sections or other subdivisions: he merely gave the characters of the three reduced genera, *Nymphaea* Boerh., *Leuconymphaea* Boerh., and *Nelumbo* Tournef. Fortunately the parallel case of



*Trifolium* shows what Linné really meant. In 1737 he cited five reduced genera with their diagnoses in an "Observation" under *Trifolium*, and in 1742 he added a sixth reduced genus (Gen. Pl. ed. 1, 229; ed. 2, 356; ed. 5, 337). In *Species Plantarum*, ed. 1, 764, however, he recognized only five subdivisions of *Trifolium*. These were *Meliloti* (corresponding with *Melilotus* Tourn.), *Lotoidea* (comprising, two reduced genera, *Lupinaster* Buxb. and *Trifoliastrum* Mich.), *Lagopoda* (including both *Lagopus* Riv. and *Triphylloides* Pont.), *Vesicaria* (corresponding to none of the reduced genera) and *Lupulina* (corresponding to *Lupulinum* Riv.). Here, where Linné actually published subdivisions of a genus, only two out of five corresponded with individual reduced genera, two other subdivisions each comprised two of the reduced genera, and the fifth corresponded to none of them.

Take another example, that of *Centaurea* L. Gen. Pl. ed. 5, 389. The "Observation" included the names of *eight* reduced genera with their diagnoses, namely, *Calcitrapa*, *Calcitrapoides*, *Rhaponticum*, *Rhaponticoides*, *Amberboi*, *Jacea*, *Cyanus*, *Crocodilium*. In Sp. Pl. ed. 1, 909, Linné recognized only six subdivisions, namely *Jacea*, *Cyani*, *Rhapontica*, *Stoebae*, *Calcitrapae*, *Crocodiloidea*. It should be obvious that reduced genera cited in an "Observation" by Linné with diagnoses were not necessarily regarded by him as sections.

In conclusion I may refer to Mr. Mackenzie's argument that Linné's "account of certain parts of the flower in his description of the genus in the first five editions of the *Genera Plantarum* began with certain phrases applicable only to the yellow water lily" [the italics are mine]. As Conard has pointed out, Linné's description went on with certain phrases applicable only to the white water lily. Perhaps I may be pardoned for having assumed that Mr. Mackenzie was here relying on "priority of place" in the description.

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## CONTRIBUTIONS FROM THE GRAY HERBARIUM OF HARVARD UNIVERSITY,—NO. LXXIX.

(Continued from page 49.)

### VI. PRIMULA § FARINOSAE IN AMERICA

(Plate 169)

THE genus *Primula*, only slightly represented in America, but one of largest genera in the flora of Eurasia, is notoriously difficult of

classification. In America we know little of the complications which the student of the Eurasian flora must consider in untangling the species; but in the § *Farinosae* we have a slight illustration of these difficulties. This is best shown by the fact that the European *P. farinosa* L., which is apparently not found in America, has for more than a century held an undisputed, though changeable, position in our flora; and, although perfectly distinct species with natural geographic ranges, such as *P. mistassinica* Michx. (1803), *P. decipiens* Duby (1844), *P. incana* Jones (1895) and *P. specuicola* Rydb. (1913), have from time to time been set off, their authors have often stated that their new segregates were being distinguished from *P. farinosa*, which they believed to occur elsewhere in America.

*Primula farinosa* seems first to have been listed as a member of the American flora in 1813 when Muhlenberg<sup>1</sup> cited it as a Canadian plant with *white* corolla. Just what he referred to is not clear unless it were *P. mistassinica*, forma *leucantha*. *P. farinosa* was more definitely admitted to our flora by Nuttall<sup>2</sup> in 1818, as growing "On the calcareous gravelly shores of the islands of Lake Huron; . . . and . . . in the outlet of Lake Michigan," Nuttall's plant being really a species intermediate between *P. farinosa* and *P. mistassinica*. In 1822 Torrey<sup>3</sup> again identified the plant of the shores of Lake Huron with *P. farinosa*, saying: "On a careful comparison of the American plant with specimens of *P. farinosa*, from Germany and Norway, I can find no difference except that the leaves are more *toothed* than *crenate* in the former"; and, on account of the leaves Torrey<sup>4</sup> later called the plant of Lakes Huron and Michigan *P. farinosa*  $\beta$ . *americana* but wrongly identified with it *P. pusilla* Goldie,<sup>5</sup> this time saying: "*Professor Hooker*, however, thinks the *P. pusilla* of Goldie to be very distinct from *P. farinosa*; though there can be no doubt that it is the plant described above." Goldie's *P. pusilla*, however, as shown by his description, illustration and locality (near Quebec), was a common broad-leaved phase of *P. mistassinica*, with which species it has subsequently been generally united; and it is not conspecific with the plant described by Torrey.

Gradually in America the conviction became firmly established, that *P. farinosa* has farinose lower leaf-surfaces and calyx, *P. mistas-*

<sup>1</sup> Muhl. Cat. 19 (1813).

<sup>2</sup> Nutt. Gen. i. 119 (1818).

<sup>3</sup> Torr. Am. Journ. Sci. iv. 59 (1822).

<sup>4</sup> Torr. Fl. No. and Mid. U. S. i. 213 (1824).

<sup>5</sup> Goldie, Edinb. Phil. Journ. vi. 322, t. xi, fig. 2 (1822).



*sinica* green and efarinose; and with this highly inconstant vegetative character as the leading difference the two are distinguished in recent manuals. In the *Synoptical Flora* Gray<sup>1</sup> so maintained *P. farinosa* for the farinose plants of the Gulf of St. Lawrence region (Labrador to Nova Scotia and eastern Maine), Lake Superior, the Rocky Mountains and southern South America (four quite distinct species) and merged them without question with the very different Eurasian plant; while, merely because of its efarinose quality, he placed under *P. mistassinica* the otherwise quite distinct *P. stricta* Hornem. of the arctic regions. In 1907, still clinging to the tradition that all plants with pronounced mealiness on the foliage or calyx are *P. farinosa* but not satisfied that the species was a unit, I suggested<sup>2</sup> the division of the American plant into typical *P. farinosa* and three varieties; var. *americana* Torr. (a species endemic on the shores of the upper Great Lakes), var. *macropoda* Fernald (a mixed series, but primarily based on the plant centering about the Gulf of St. Lawrence) and var. *incana* (Jones) Fernald, based on *P. incana* of the Rocky Mountains and Great Plains. But the most reactionary treatment is that of Pax & Knuth<sup>3</sup> in *Das Pflanzenreich*, where not only are *P. mistassinica* and *P. decipiens* ("*P. magellanica*") mingled with *P. farinosa*, but where *P. farinosa*, subsp. *eufarinosa*, var. *genuina* Pax is made to include, of course, true *P. farinosa* of Europe, but also the Rocky Mountain and Great Plain *P. incana* and (by citation of specimens) the species of the Gulf of St. Lawrence which I have called *P. farinosa*, var. *macropoda*, but which is really quite distinct from both the European and the Rocky Mountain species. Only a casual examination of typical European *P. farinosa*, the Great Plain and Rocky Mountain *P. incana* and the eastern American *P. farinosa*, var. *macropoda* is needed to show how artificial is a classification which makes the three species quite identical (subsp. *eufarinosa*, var. *genuina*!): European *P. farinosa*, a very slender plant with the subulate involucre bracts 4–7 mm. long, mostly only  $\frac{1}{2}$ – $\frac{1}{3}$  as long as the filiform pedicels, the mature (fruiting) strongly ribbed calyx 4–6 mm. long, the corolla-lobes 4–6 mm. broad; *P. incana* coarser, with the lanceolate to linear-oblong flat involucre bracts 0.5–1 cm. long, mostly nearly equaling to exceeding the short and stout flowering pedicels, the mature calyx 8–10 mm. long and only obscurely ribbed,

<sup>1</sup> Gray, *Syn. Fl.* ii. pt. 1: 58 (1878).

<sup>2</sup> *RHODORA*, ix. 15, 16 (1907).

<sup>3</sup> Pax & Knuth in Engler, *Pflanzenr.* iv<sup>237</sup>. Primulaceae (1905).

the corolla-lobes 2-3 mm. broad; *P. farinosa*, var. *macropoda*, a coarse plant with subulate involucre bracts 0.5-1.4 cm. long and with stout pedicels, the mature almost ribless calyx 5.5-11 mm. long, the corolla-lobes 3.5-5.5 mm. broad.

Or again, the essentially Canadian *Primula mistassinica*, which superficially more closely simulates *P. farinosa* than do the other species, but which has consistently different seeds, is a very delicate and slender plant with subulate involucre bracts only 2-6 mm. long, elongate filiform pedicels, mature calyx 3-6 mm. long and only 2-3.5 mm. in diameter, and tiny smooth or obscurely reticulated seeds rarely 0.5 mm. long (European *P. farinosa* with coarser and conspicuously pebbled or reticulated seeds); but the Magellanic species (included by Pax & Knuth along with the Canadian *P. mistassinica* under *P. farinosa*) is stout (scapes up to 4 mm. thick), with flat lanceolate involucre bracts 6-10 mm. long, umbel almost capitate owing to the abbreviated stout pedicels, mature calyx about 1 cm. long and 5 mm. in diameter, and with the largest seeds of the section, fully 1 mm. long and covered with long and conspicuous murications. That as plants *P. mistassinica* and the coarse plant of southern South America are not conspecific is perfectly apparent and their inclusion along with *P. incana* and others in *P. farinosa* by Pax & Knuth is due to the reliance by those authors upon single key-characters, rather than upon the sum-total of characters which really mark the different species but which, throughout their work, they largely ignore.

The result of reliance upon single, and almost exclusively vegetative, characters is inevitably either under-classification, such as has just been illustrated, or over-classification and the complete segregation in a treatment of plants which are really closely related or even of individuals of a single species. The sections of *Primula* defined by Pax and Knuth well illustrate this difficulty. Thus, the only character given by them in *Das Pflanzenreich* for the § *Minutissimae* (3 species of Thibet and the Himalaya) is "Species stoloniferae," the succeeding 16 sections (including § *Farinosae*) being "Species astolonae." Nevertheless, *P. mistassinica* (included by them under *P. farinosa*) may sometimes develop flagelliform and leafy stolons up to 7 cm. long! Again, § *Farinosae* is distinguished from all the 8 succeeding sections by "Bracteae involucrales basi gibbosae vel saccato-productae," yet *P. farinosa* and four others in the section



are promptly grouped together because they have "Bracteae basi vix gibbosae." Based upon single characters, such as are above illustrated, the sections and keys to species of *Das Pflanzenreich* are perplexing and contradictory in the extreme; and it is impossible to avoid the conviction that a vast reduction and reorganization will be necessary before *Primula* attains a natural classification. The *Farinosae* in America are certainly real entities and when their different characters are closely studied they resolve themselves very satisfactorily into species with definite combinations of characters, especially of flowers, fruits and seeds, and with clearly defined and natural geographic ranges. As a result of an intensive study of this small group extending over several weeks the following treatment of the American species is proposed as at least some advance over the treatments heretofore available, although, on account of poor material, it is still necessary to treat two or three plants in a tentative and, therefore, unsatisfactory manner.<sup>1</sup>

Besides the material in the Gray Herbarium and the herbarium of the New England Botanical Club, I have had the great advantage of examining the splendid series of specimens in the National Herba-

<sup>1</sup> One species of § *Nivales* and, therefore, not included in the following synopsis is not generally passing under its earliest specific name and should have its nomenclature clarified. This is the species treated by Gray in the *Synoptical Flora* as *P. nivalis* Pallas. Subsequently, it has been repeatedly shown that the plants of the Bering Sea region are quite distinct from Pallas's species of central and western Asia; but the characters relied upon by Pax and by Greene to separate the Bering Sea plant into two species do not hold. Thus Pax, following Greene, distinguished *P. eximia* Greene from *P. pumila* (Ledeb.) Pax by "Corollae lobi . . . acuti, non emarginati" as contrasted with "Corollae . . . lobi . . . retusi vel leviter emarginati vel integri" in *P. pumila*; but Mrs. Busch's beautiful plate shows them both with obtuse and strictly entire summits, while specimens from the type-station, St. Paul's Island, show conclusively that the lobes of *P. eximia* may be definitely emarginate. Differing only in size of parts the two are apparently not separate species, but they are well marked varieties and Mrs. Busch so treats them. She fails, however, to take up the earliest specific name, not apparently because it is of difficult pronunciation, but because she consistently retains the oldest name of whatever rank and consequently adheres to *P. pumila* (Ledeb.) Pax. By the International Rules the names of the two varieties are

*P. TSCHUKTSCHORUM* Kjellm., var. *pumila* (Ledeb.), n. comb. *P. nivalis*, γ. *pumila* Ledeb. Fl. Ross. iii. 10 (1847-49). *P. nivalis* Gray, Syn. Fl. N. A. ii. pt. 1: 59 (1878), not Ledeb. *P. Tschuktschorum* Kjellm. in Nordensk. Vega-Exp. Vetensk. Jagtt, i. 516, t. ix. (1882) in part, and Wissenschaftl. Ergebn. Vega-Exped. 331, t. 5 (1883). *P. pumila* (Ledeb.) Pax, Engler's Bot. Jahrb. x. 208 (1889). *P. pumila*, var. *Ledebouriana* E. Busch, Fl. Sib. et Orient. Extr. Cem. 65: 75, fig. B (1926).

Var. *arctica* (Koidzumi), n. comb. *P. nivalis* Gray, Syn. Fl. N. A. ii. pt. 1: 59 (1878) in part, not Ledeb. *P. eximia* Greene, Pittonia, iii. 251 (1897); J. M. Macoun in Fur Seals and Fur-Seal Isl. N. Pacif. Oc. iii. 568, t. xcii. (1899). *P. Macounii* Greene, l. c. 251, 260 (1897); J. M. Macoun, l. c. 569, t. xciii (1899). *P. arctica* Koidzumi, The Bot. Mag. (Japan), xxv. 216 (1911). *P. pumila*, var. *arctica* (Koidzumi) E. Busch, Fl. Sib. et Orient. Extr. Cem. 65: 75, fig. A (1926).

rium of Canada (cited as "Can.") kindly placed at my disposal by Dr. Malte, and the Primulas in the herbaria of the University of Minnesota (cited as "Minn.") generously loaned by Dr. Butters, and of the University of Pennsylvania submitted by Mr. Fogg.

# KEY TO AMERICAN SPECIES OF PRIMULA § FARINOSAE

- a. Bracts of involucre subulate, lanceolate or linear-oblong above the dilated base, tapering gradually to the tip; their bases either gibbous, rounded or tapering, rarely much prolonged—b.
- b. Leaves mostly dentate or at least distinctly crenate, petioled or merely narrowed to base, farinose or efarinose: limb of corolla 0.5–2 cm. across: mature capsule from shorter than to at most twice as long as the calyx, thick-cylindric to ellipsoid-ovoid, 2–5 mm. in diameter: seeds dark-brown or fulvous, smooth or rough—c.
- c. Comparatively stout plants: scape 0.6–4 mm. in diameter just below the involucre, excluding the umbel 0.1–4.5 dm. high: involucre bracts 0.3–1.4 cm. long: pedicels 0.4–1 mm. in diameter: mature calyx 3.8–11 mm. long, 2.5–6 mm. in diameter at summit of tube: anthers and stigma overtopped by the corolla-tube, not exerted from the throat of the shrivelled corolla: capsules 2.5–5 mm. in diameter: seeds muricate or distinctly reticulated (cf. no. 6), 0.5–1 mm. long—d.
- d. Lobes of mature calyx obtuse to acute but not subulate-tipped: corolla-tube 4–7 (rarely –9) mm. long; lobes shallowly emarginate to deeply obcordate: capsule equaling to exceeding the calyx—e.
- e. Bracts of involucre subulate or tightly involute above the dilated base.
  - Leaves green beneath, very rarely a little farinose, subentire or obscurely undulate-dentate, 0.5–4 cm. long, 0.2–1.5 cm. broad: mature calyx 3.8–6 mm. long, efarinose or only scantily farinose; the lobes about half as long as the tube: limb of corolla 5–8 mm. broad; lobes oblong or narrowly cuneate, 1–3 mm. broad, shallowly emarginate, the segments 0.2–1 mm. long ..... 1. *P. stricta*.
  - Leaves strongly farinose (rarely efarinose) beneath, mostly dentate, 1–13 cm. long, 0.3–3 cm. broad: mature calyx 5.5–11 mm. long, usually strongly farinose; lobes about equaling the tube: limb of corolla 9–13 mm. broad; lobes broadly obcordate, 3.5–5.5 mm. broad, with segments 1.5–3 mm. long ..... 2. *P. laurentiana*.
- e. Bracts of involucre lanceolate to linear-oblong, flat (slightly involute only on drying).
  - Calyx copiously farinose; the oblong obtuse or rarely acutish lobes shorter than the tube: corolla-tube slightly exceeding the calyx; limb 6–10 mm. broad, lilac, with oblong to cuneate-obovate lobes 2–3 mm. broad: capsule only slightly exceeding the calyx: seeds 0.5–0.7 mm. long, strongly angled ..... 3. *P. incana*.



- Calyx efarinose or only sparingly farinose; the oblong-lanceolate acute to obtuse lobes equaling the tube: corolla-tube shorter than to barely equaling the calyx; its white (rarely lilac-tinged) limb 1.2–2 cm. broad, with lobes 3.5–6 mm. broad: capsule distinctly exceeding the calyx: seeds 1 mm. long, rounded-obovoid. . . . .4. *P. decipiens*.
- d. Lobes of mature calyx sharply acuminate to subulate-tipped: corolla-tube 8–10 mm. long; its limb 6–10 mm. broad, with the narrowly cuneate lobes merely emarginate: capsule much overtopped by the calyx-lobes. . . . .5. *P. specuicola*.
- c. Comparatively slender: scapes 0.3–1.8 mm. in diameter just below the involucre, excluding the umbel 0.1–2.5 dm. high: involucre bracts 2–6 mm. long: pedicels 0.2–0.5 mm. in diameter: mature calyx 3–6 mm. long, 2–3.5 mm. in diameter at summit of tube: stigma or tops of anthers exerted from the throat of the shriveled corolla: capsule 2–3 mm. in diameter: seeds smooth or only obscurely reticulated (strongly reticulated in no. 6), 0.3–0.6 mm. long—f.
- f. Most of the leaves merely cuneate at base or narrowed gradually to the broad subpetiolar base, with 2–15 pairs of teeth: involucre bracts rarely saccate-gibbous at base—g.
- g. Seeds strongly angulate and truncated, prominently rugose or reticulated: leaves often farinose beneath. . . . .6. *P. intercedens*.
- g. Seeds rounded-obovoid, nearly smooth or obscurely linear-reticulated.
- Leaves copiously farinose beneath, somewhat rhombic: pedicels and calyx farinose. . . . .7. *P. ajanensis*.
- Leaves green, very rarely farinose, oblanceolate to obovate: pedicels efarinose: calyx usually efarinose. . . . .8. *P. mistassinica*.
- f. Most of the leaves with petioles longer than the rather abruptly dilated rhombic, ovate or cuneate-obovate blades; the blades with few (1–7) pairs of teeth confined to the upper half or entire.
- Corolla-limb 7–10 mm. broad; its emarginate to obcordate lobes 1.5–3 mm. broad: involucre bracts not saccate at base. . . . .9. *P. parvifolia*.
- Corolla-limb 1.2–2 cm. broad; its deeply obcordate lobes 5–8 mm. broad: involucre bracts usually saccate-gibbous at base. . . . .10. *P. borealis*.
- l. Leaves entire, undulate or rarely slightly dentate, distinctly slender-petioled, efarinose: limb of corolla 5–9 mm. broad, white or violet; its cuneate lobes distinctly shorter than the tube, 1.6–4 mm. broad, cleft a third or half their length: mature capsules slender-cylindric, tapering at summit, becoming 2–3 times as long as the calyx, 7–13 mm. long, 1.8–2.1 mm. in diameter: seeds pale-brown to stramineous, smooth. . . . .11. *P. egaliksensis*.
- a. Bracts of involucre oblong or narrowly obovate, obtuse or abruptly contracted at tip; their bases often prolonged into narrow saccate auricles 1–1.5 mm. long: leaves slender-petioled, entire. . . . .12. *P. sibirica*.

1. *P. STRICTA* Hornem. *Leaves green, or only sparingly farinose beneath, oblanceolate to narrowly obovate, entire to obscurely undulate-dentate, 0.5-4 cm. long, 0.2-1.5 cm. broad; scape 1.5-30 cm. high, rather strict and stout, 1-2 mm. in diameter below the inflorescence, green or purplish and farinose; involueral bracts lance-subulate, usually saccate or gibbous at base, 3-8 mm. long; umbel 2-8-flowered; pedicels erect or nearly so, in anthesis from shorter than to twice as long as the bracts; calyx urceolate-campanulate, farinose, in maturity 3.8-6 mm. long, 3.5-5 mm. in diameter at summit of tube; the lobes oblong to narrowly deltoid, obtuse to acute, about half as long as the tube; corolla lilac or violet; the tube distinctly exerted; the limb 5-8 mm. broad; lobes oblong to narrowly cuneate, 1-3 mm. broad, shallowly notched, the segments 0.2-1 mm. long; capsule ellipsoid, only slightly exceeding the calyx, 3-4 mm. in diameter; seeds more or less angulate, dark-brown or fulvous, 0.5-0.8 mm. long, conspicuously reticulated.*—Hornem. in Fl. Dan. viii. fasc. 24, t. mcccxxxv. (1810); Duby in DC. Prodr. viii. 44 (1844); Lange, Consp. Fl. Groenl. 70 (1880); Pax & Knuth in Engler, Pflanzenr. iv<sup>237</sup>. 86 (1905); J. M. Macoun & Holm, Rep. Can. Aret. Exped. 1913-18, v. pt. A. t. xi. fig. 6 (1921); E. Busch, Fl. Sib. et Orient. Extr. iv. Cem. 65: 38 (1926). *P. farinosa*, *β. stricta* (Hornem.) Wahlenb. Fl. Lapp. 60 (1812). *P. Hornemaniana* Lehm. Monogr. Prim. 55, t. 4 (1817); Hook. Fl. Bor.-Am. ii. 120 (1838), in small part only. *P. glabrescens* F. Nylander ex W. Nyl. & Saelan, Herb. Mus. Fenn. (1859) 32, acc. to Pax & Knuth. *P. mistassinica* Gray, Syn. Fl. N. A. ii. pt. 1: 58 (1878) in part, not Michx. (1803). *P. farinosa*, var. *mistassinica* Pax, Engler's Bot. Jahrb. x. 200 (1889) in part, not *P. mistassinica* Michx. (1803). *P. farinosa*, var. *groenlandica* Pax in Engler, Pflanzenr. iv<sup>237</sup>. 84 (1905) in part, not *P. stricta*, var. *groenlandica* Warming (1886). *P. farinosa*, var. *macropoda* Fernald, RHODORA, ix. 16 (1907) in small part (as to citation of Keewatin plant). *P. stricta* var. *jacutensis* E. Busch, Fl. Sib. et Orient. Extr. iv. Cem. 65: 36 (1926).—Arctic and subarctic Eurasia, Greenland and North America; with us south to northern Labrador, northwestern Quebec, northern Ontario and Alberta. The following American specimens have been examined. GREENLAND: without locality, ex Lehmann; Umenak, Rink; Atâ, lat. 70° 16', August 6, 1921, A. E. Porsild; Qeqerlatik Najarsuit, lat. 66° 44', August 3, 1911, M. P. & A. E. Porsild; Kûgsinerssuaq and Atâ, lat. 70° 17', July 11, 1923, M. P. Porsild; Itivdleq-Fjord, Quingua, lat. 66° 29', July 6, 1926, M. P. Porsild; the Porsild specimens all distributed as *P. mistassinica*. LABRADOR: moist banks, Nachvak, R. Bell, no. 15,829 (Can.), as *P. mistassinica*; Rama, A. Stecker, no. 78, as *P. farinosa*. QUEBEC: Ungava ("northern Labrador"), 1884, L. M. Turner, July, 1897, A. P. Low, no. 24,529 (Can.), as *P. egalikensis*; River Kovik, lat. 61° 59', Hudson Straits, Low, no. 23,025 (Can.), as *P. farinosa*; Richmond Gulf, June 28, 1890, Spradborough, no. 14,421, June 12, 1899, Low, no. 63,242 (Can.), both as *P. sibirica*;



north of Cape Jones,<sup>1</sup> James Bay, *A. P. Low*, no. 63,244, as *P. stricta*, altered to *P. sibirica*; damp banks, South Twin Island, James Bay, *J. M. Macoun*, no. 15,831 (Can.), as *P. farinosa*. ONTARIO: "growing below high-water mark," west coast of Hudson Bay, lat. 56°, August, 1886, *J. M. Macoun*, no. 15,850 (Can.), as *P. mistassinica* or *P. sibirica*; Cape Henrietta Maria, *Spreadborough*, no. 62,555 (Can.); mouth of Ekwan River, James Bay, *Dowling*, no. 34,526 (Can.), as *P. farinosa*; The Beacon, mouth of Moose River, *Spreadborough*, no. 62,554 (Can.), as *P. sibirica*. MANITOBA: Churchill, lat. 58° 50', *J. M. Macoun*, no. 79,388, as *P. stricta* or *P. farinosa*; Churchill River, *C. E. Cairnes*, no. 89,722 (Can.), as *P. mistassinica*. MACKENZIE: Arctic seacoast, *Richardson*; Mackenzie River, *Richardson*; south coast of Coronation Gulf, Port Epworth, *Cox & O'Neill*, no. 581; Bernard Harbour, *Frits Johansen*, no. 347; Great Bear River, *Elizabeth Taylor*, no. 87; shore, Great Slave Lake, *R. Bell*, no. 23,151 (Can.). YUKON: near mouth of Lewis River, *Gorman*, no. 1052 (Can.). ALBERTA: Rocky Mountains, *Drummond*, as *P. farinosa* or *P. scotica*; head of Pabocton Trail, *S. Brown*, no. 1107, as *P. borealis*.

The Greenland and American plants cited seem to me quite inseparable from Scandinavian material of typical *P. stricta*, although the tiny plants from the Arctic coast of Mackenzie might be set off as var. *jacutensis* E. Busch; they agree closely with Mrs. Busch's description and figure of the plant of northeastern Siberia, but seem more like dwarfed arctic extremes than a true variety.

Pax & Knuth exclude *P. stricta* from America and cite all Greenland and Labrador material under *P. farinosa*, var. *groenlandica*, which they base upon *P. stricta*, var. *groenlandica* Warming, Svensk. Vet. Akad. Handl. xii. Afd. iii. No. 2: 21, fig. 7, A-D (1886). Lange, Conspect. Fl. Groenl. 260 (1887), however, maintained both *P. stricta* and *P. stricta*, var. *groenlandica* Warm. in the Greenland flora, remarking that the latter is a "Forma intermedia inter *P. strictam* et *P. egaliksensem*." Surely, the figures of var. *groenlandica* published by Warming are of a plant scarcely, if at all, separable from *P. egaliksensis*. The distinctly petioled leaf with abruptly dilated entire blade, the large and plane involucre bracts, short flowering pedicels, comparatively slender calyx with narrow lobes, only slightly exserted corolla-tube with deeply-notched lobes are all characters of *P. egaliksensis* and Warming's figures are readily matched in that species, but not in *P. stricta*. In fact, Warming's

<sup>1</sup> The material is labeled in the hand of the late J. M. Macoun "North of Cape Jones, Hudson Strait"; but Low's report for 1899, when it was collected, explicitly refers to "Cape Jones at the entrance to James Bay"—See Low, Geol. Surv. Can. Ann. Rep. n. s. xii. 144A (1902).

figures are not appreciably unlike the original plate of the white-flowered *P. egalikensis* Wormsk. in Hornem. Fl. Dan. ix. fasc. 26: t. mdxi. (1816), except that *P. stricta*, var. *groenlandica* has purple corollas. Just such a plant occurs across boreal America, in northern Newfoundland, northern Quebec, Alberta, British Columbia and Alaska; and of the abundant series which I have collected and studied in Newfoundland (six numbers, representing all stages from young flowers to mature fruit) the smaller specimens exactly match Warming's original figures of *P. stricta*, var. *groenlandica* and, better still, the four individuals in the Gray Herbarium of his type collection, gathered at Itivnek-Elvens in the Holstensborg District of Greenland on July 13, 1884. The Newfoundland plant with violet corollas, watched closely in the field, can be separated from typical white-flowered *P. egalikensis* only by its intense color. Its fruit, collected at a specially marked station, is quite like that of *P. egalikensis*, except that the capsules are deeper-colored: the slenderly cylindric capsules 2-3 times as long as the calyx and only 1.5-1.8 mm. thick (the capsules of *P. stricta* ellipsoid, only slightly exceeding the calyx and 3-4 mm. in diameter; the capsules of *P. farinosa* likewise ellipsoid, only slightly exserted and thick). Furthermore, in both *P. farinosa* and *P. stricta* the dark-brown seeds are obviously muricate or reticulated, in *P. egalikensis* the stramineous or pale-brown seeds smooth or at most obscurely reticulated; and the seeds of *P. stricta*, var. *groenlandica* are like those of *P. egalikensis*. It is now very clear, then, that *P. stricta*, var. *groenlandica* Warming belongs neither to *P. stricta* with which he placed it nor to *P. farinosa* to which it was transferred by Pax & Knuth, but that it is a variation of *P. egalikensis*, as Lange has already suggested. It is, furthermore, clear that most of the material cited by Pax & Knuth under *P. farinosa*, var. *groenlandica* really belongs to *P. stricta*.

2. *P. laurentiana*, Fernald, nom. nov. (Plate 169). *Leaves farinose* (rarely *efarinose*) *beneath*, oblanceolate, spatulate or narrowly rhombic-ovate, mostly petioled and *dentate*, 1-13 cm. long, 0.3-3 cm. broad: *scape* 0.1-4.5 dm. high, strict and stout, 0.6-3 mm. in diameter below the inflorescence, often *farinose* at summit: *involucral bracts lance-subulate* or *strongly involute*, usually strongly saccate or gibbous at base, 0.5-1.4 cm. long: *umbel* 1-17-flowered: *pedicels* erect or strongly ascending, from practically wanting to 5 cm. long, comparatively stout (up to 1 mm. thick): *calyx* urceolate-campanulate, usually *farinose*, in maturity 5.5-11 mm. long and 3-6 mm. in diameter at summit of tube; the *lobes* lanceolate, oblong or narrowly deltoid,

obtuse to acute, about equaling the tube: corolla lilac; the tube but slightly exerted; the limb 9–13 mm. broad; lobes broadly obcordate, 3.5–5.5 mm. broad, with segments 1.5–3 mm. long; style and anthers not exerted from the yellow throat: capsule ellipsoid, from slightly exerted to twice as long as the calyx, 2.5–5 mm. in diameter; its valves splitting into linear halves 1.5–2 mm. wide: seeds angulate, 0.5–0.8 mm. long, conspicuously reticulated: flowers with the fragrance of *Narcissus Jonquilla*; roots musky.—*P. pusilla* Sweet, Brit. Fl. Gard. ser. 2, i. t. 5 (1831), not Goldie (1822). *P. farinosa* var. *macropoda* Fernald, RHODORA, ix. 16 (1907) mostly, including the type-specimen, not *P. macropoda* Craib, Notes Roy. Bot. Gard. Edinb, xi, 176 (1919). *P. scotica* Hook. Fl. Bor.-Am. ii. 120 (1838), not Hook. in Curt. Fl. Lond. iv. t. 133 (1821). *P. farinosa*, var. *genuina* Pax in Engler, Bot. Jahrb. x. 199 (1889) as to eastern American citations. *P. farinosa*, subsp. *eufarinosa*, var. *genuina* Pax & Knuth in Engler, Pflanzenr. iv<sup>237</sup>. 83 (1905), as to citation of eastern Canadian plant. *P. farinosa*, var. *americana* Fernald, RHODORA, xxviii. 224 (1926), not Torr. Fl. No. and Mid. U. S. i. 213 (1824). *P. farinosa*, var. *incana* St. John, Can. Dept. Mines. Mem. no. 126: 104 (1922); Fernald, RHODORA, xxviii. 224 (1926); not var. *incana* (Jones) Fernald RHODORA, ix. 16 (1907). *P. farinosa* of eastern Am. authors, not L. (1753).—Ledges and cliffs, chiefly calcareous, southern Labrador to Nova Scotia and eastern and north-central Maine. The following, selected from many specimens, are characteristic. LABRADOR: banks of Naskaupi River, about 18 miles from mouth, Wetmore, no. 103,037; Indian Harbor, lat. 54° 27', Ralph Robinson, no. 102; Battle Harbor, Bowdoin College Exped. no. 104; Barge Point, July 17, 1913, W. E. Ekblaw; Forteau, 1870, S. R. Butler. NEWFOUNDLAND: turf limestone barrens, Burnt Cape, Fernald, Wiegand, Pease, Long, Griscom, Gilbert & Hotchkiss, no. 28,905; gravelly limestone shore, Schooner (or Brandy) Island, Pease & Long, no. 28,907; wet limestone ledges, St. Barbe, Fernald, Long & Dunbar, no. 26,956; talus of calcareous sandstone escarpments, Bard Harbor Hill, Fernald & Long, no. 28,912; calcareous rocks and talus, Port Saunders Harbor, Fernald & Wiegand, no. 3889; conglomerate limestone, etc., Cow Head, Fernald & Wiegand, nos. 3885, 3887; boggy spots on rocky crests, Twillingate, Fernald, Wiegand & Bartram, no. 6068; dry sea-cliffs, Tilt Cove, Fernald, Wiegand & Darlington, no. 6069; bare spots, French (or Tweed) Island, Fernald, Long & Fogg, no. 375; cliffs near Frenchman's Cove, Bay of Islands, Mackenzie & Griscom, no. 10,402; calcareous gravelly bank, Port au Port, Fernald & Wiegand, no. 3886. QUEBEC: limestone and calcareous sandstone terraces, Blanc Sablon,<sup>1</sup> Fernald & Wiegand, nos. 3888, 3890, Fernald, Wiegand & Long, no. 28,914; grassy shore, Wapitagun, July 14, 1927, H. F. Lewis (Can.); rocky shore, Goynish, St. John, no. 90,675; limestone headland,

<sup>1</sup> The original labels read "Labrador," but by recent decision of the Privy Council Blanc Sablon is transferred to Quebec.



Pointe-aux-Esquimaux, Mingan, *St. John*, no. 90,674; plages calcaires de la petite rivière, Pointe-aux-Esquimaux, *Victorin & Rolland*, no. 18,485; sur les calcaires du rivage, Ile à Marteau, Mingan, *Victorin & Rolland*, no. 18,565; sur les rivages calcaires, Grande Ile, Mingan, *Victorin & Rolland*, no. 21,832; Baie Ellis, Anticosti, *Victorin*, no. 4188; alluvion argilo-calcaire, Rivière Jupiter, Anticosti, *Victorin & Rolland*, no. 25,139; Salt Lake, Anticosti, *J. Macoun*, no. 15,833 (Can.); Bonaventure conglomerate (calcareous) sea-cliffs, Bonaventure Island, *Fernald & Collins*, no. 1148, *Victorin et al*, nos. 17,642, 17,644; cliffs and ledges, Percé, *J. M. Macoun*, no. 68,949 (Can.), *Collins, Fernald & Pease*, nos. 5319, 5320, 5434, 5435, 5554, *Fernald & Collins*, nos. 1147, 1149; sur les calcaires, Anse à l'Indien, *Victorin, Rolland, Brunel & Rousseau*, no. 17,643; limestone cliffs, Cape Rosier, *Frits Johansen*, no. 103,287 (Can.); calcareous sea-cliffs, Christie, *Fernald & Pease*, no. 25,233; sea-cliffs, Tourelle, *Griscom, Mackenzie & Smith*, no. 25,981; calcareous sea-cliffs, Jaco Hughes, *Fernald & Pease*, no. 25,232; wooded banks of the St. Lawrence, Matane, August 7, 1904, *F. F. Forbes*; shaded calcareous cliffs, Bic, *Fernald & Collins*, nos. 243 (TYPE in Gray Herb.), 1146; wet shore of the St. Lawrence, Temiscouata, August 7, 1879, *Pringle*; Pointe à Persil, Rivière du Loup, *Victorin*, no. 131. MAGDALEN ISLANDS: Entry Island, June 23, 1861, *Hyatt, Verrill & Shaler*. NOVA SCOTIA: dripping cliffs, Baxter's Harbour, July 10, 1900, *F. G. Floyd*; cliffs and ledges, Morden, *W. H. Harrington*, no. 644 (Can.); crests of basalt cliffs by Bay of Fundy, near Margaretville, *Bissell, Bean, White & Linder*, no. 22,234; turfy crests and slopes of exposed headlands, Markland (Cape Forchu), *Fernald, Bartram, Long & Fassett*, no. 24,327; Chebogue Point, *John Macoun*, no. 81,152. MAINE: Houlton, 1880, 1881, *Kate Furbish*; foot of Mt. Kineo, Moosehead Lake, August, 1866, *A. H. & C. E. Smith*; north side of Mt. Kineo, September 21, 1887, *G. G. Kennedy*; gravel, Libby Islands, Machiasport, *Cushman & Sanford*, no. 1515.

*P. laurentiana* is the plant published originally as *P. farinosa*, var. *macropoda*. On account of *P. macropoda* Craib it is necessary to assign a new name. It is a coarser plant than the European *P. farinosa* to which it has always been referred, either as identical or as a geographic variety. The dwarf northern extremes (from southern Labrador and northern Newfoundland) simulate *P. farinosa* and have often been mistaken for it, but in its typical development, *P. laurentiana* is taller and stouter; the bracts of the involucre longer, 0.5-1.4 cm. long (in European *P. farinosa* 4-7 mm. long); the pedicels stouter; the calyx commonly much more farinose, urceolate-campulate, in fruit 5.5-11 mm. long and 3-6 mm. in diameter (the efarinose to but slightly farinose calyx of *P. farinosa* more turbinate,

in fruit only 4–6 mm. long and 2.5–4 mm. in diameter); the capsules larger and the seeds with more conspicuous reticulation. Plate 169 is from a photograph taken at the type-station by Professor J. F. Collins.

In view of the pronounced selection of calcareous habitats by *P. laurentiana* it is worth noting that Contejean classified the European *P. farinosa* as one of the "*Calcifuges presque indifférentes, cependant plus nombreuses sur les sols privés de calcaire*;"<sup>1</sup> and that Warming indicates<sup>2</sup> *P. farinosa* as a typical oxylophyte, listing it along with *Vaccinium uliginosum* and *V. Oxycoccus*. On the other hand, Tansley makes *Primula farinosa* in Great Britain distinctly calcicolous, saying, "*Actaea spicata* and *Primula farinosa* also seem to have found the siliceous soils of the Leeds and Halifax district an effectual barrier against a southern extension of their range";<sup>3</sup> and he definitely lists it as one of the characteristic plants which "On the Pennines, for example, . . . occur on the swamps of the limestone hills."

In *P. laurentiana* the pedicels are commonly elongate, but at the northern part of its range they may be very short or almost wanting. These specimens with abbreviated pedicels have been confused with the Great Plain and Rocky Mountain *P. incana*, but they differ from that species in their involucre bracts, broad corolla-lobes, and other characters which show them to be merely dwarfed states of *P. laurentiana*. Other plants of *P. laurentiana* with unusually small calyces and capsules have sometimes been identified with the plant of the Great Lakes which Torrey described as *P. farinosa*, var. *americana*; but the Great Lake material, though often quite farinose (and thus strongly simulating *P. farinosa* and *P. laurentiana*) has a technical character which allies it as much to *P. mistassinica*: the capitate stigma or the tops of the anthers protruding from the throat of the shrivelling corolla. The plants of Newfoundland and Quebec which have been misidentified with *P. farinosa*, var. *americana* are clearly only attenuate forms of *P. laurentiana*. The plants of Mt. Kineo, Maine are extreme cases of this attenuation; the leaves being remarkably thin and delicate, the scapes unusually slender, and the small calyces with unusually thin and sharp lobes; but these seem to be only slight ecological modifications, presumably due to the habitat,

<sup>1</sup> Contejean, *Influence du Terrain sur la Végétation*, Ann. Sci. Nat. sér. 6. ii. 300 (1875).

<sup>2</sup> Warming, *Oecology of Pl.* ed. Groom & Balfour, 193 (1909).

<sup>3</sup> Tansley, *Types of British Vegetation*, 157 (1911).

at the foot of a north-facing precipice rather than in more exposed and better illuminated spots, such as the plant usually selects.

Ordinarily *P. laurentiana*, like *P. farinosa* and *P. incana*, has the lower surface of the leaf strongly farinose or whitened with waxy particles. When the specimens have been dried over extreme heat or when immersed in alcoholic solutions in poisoning, the wax is often removed and the leaves have a deceptive post-mortem greenness. Occasionally, however, considerable colonies of *P. laurentiana* are found with absolutely green and efarinose foliage; and, unless their characters of calyx, corolla, capsule and seeds are carefully examined, they are likely to be misidentified either as *P. stricta*, which is high-northern, or with *P. mistassinica*, which abounds through much of the range of *P. laurentiana* but which has more slender scapes and pedicels, calyx and capsules, shorter bracts and smaller and only obscurely pebbled seeds. The green form of *P. laurentiana* is apparently parallel with *P. farinosa*, var. *denudata* Koch of Europe. It is merely a minor form, but as a striking variation, may appropriately be designated

*P. LAURENTIANA*, forma **chlorophylla**, n. f., foliis subtus efarinosis.—NEWFOUNDLAND: Cape Norman, *Wiegand & Long*, no. 28,909; Sacred Island, *Wiegand, Gilbert & Hotchkiss*, no. 28,908; Sandy (or Poverty) Cove, *Fernald, Long & Dunbar*, no. 26,955; Capstan Point, Flower Cove, *Fernald, Long & Dunbar*, no. 26,957; Yankee Point, *Wiegand & Hotchkiss*, no. 28,904; turfy limestone barrens, Dog Peninsula, August 27, 1925, *Fernald, Wiegand, Long, Gilbert & Hotchkiss*, no. 28,913 (TYPE in Gray Herb.); Bard Harbor, *Fernald & Long*, no. 28,911. QUEBEC: Anticosti Island, *Pursh*; Ilets Perroquets, Mingan, *Victorin & Rolland*, no. 18,421; wet mossy swale, Puffin Island, St. Mary Islands, July 27, 1927, *H. F. Lewis* (Can.). MAINE: base of Kinco Cliff, Moosehead Lake, July 24, 1866, August, 1867, *A. H. & C. E. Smith* (Penn.), June 8, 1878, *F. S. Bunker*.

3. *P. INCANA* Jones. *Leaves* strongly (rarely only slightly) farinose beneath, elliptic, oblong-obovate or spatulate, without petioles or in attenuated plants with winged petioles, obtuse, shallowly denticulate, 1.5–8 cm. long, 0.5–2 cm. broad: *scape* 0.5–4.5 dm. high, strict and stout, 1–2 mm. in diameter below the inflorescence, farinose at summit: involueral bracts lanceolate to linear-oblong, flat (slightly involute only on drying), broadly gibbous at base, 0.5–1 cm. long, mostly equaling or exceeding the short and stout flowering pedicels: umbel 2–14-flowered, subcapitate, but with some fruiting pedicels elongating to 1–2.5 cm. long: calyx urceolate-campanulate, usually strongly farinose, in maturity 8–10 mm. long and 4–5 mm. in diameter; the oblong obtuse or rarely acutish lobes shorter than the tube: corolla lilac; the tube



*slightly exceeding the calyx; the limb 6-10 mm. broad, with oblong to cuneate-obovate lobes 2-3 mm. broad; stigma and anthers not exerted from the yellow throat: capsule ellipsoid, only slightly exceeding the calyx: seeds strongly angled, 0.5-0.7 mm. long, conspicuously reticulated.*—Proc. Cal. Acad. ser. 2, v. 706 (1895). *P. farinosa*, var. Gray, Proc. Acad. Nat. Sci. Phila., 1863: 70 (1863). *P. dealbata* Engelm. in Gray, l. c. (1863) as synonym. *P. americana* Rydb. Bull. Torr. Bot. Cl. xxviii. 500 (1901). *P. farinosa*, var. *genuina* Pax, in Engler's Bot. Jahrb. x. 199 (1889) in part, as to Rocky Mt. material. *P. farinosa*, subsp. *eufarinosa*, var. *genuina* Pax & Knuth in Engler, Pflanzenr. iv<sup>237</sup>. 83 (1905), as to synonymy in part and citation of Colorado material. *P. farinosa*, var. *incana* (Jones) Fernald, RHODORA, ix. 16 (1907). *P. farinosa*, var. *macropoda* Fernald, RHODORA, ix. 16 (1907) in small part (as to plants of Saskatchewan, Athabasca and Mackenzie). Illustrated as *P. farinosa* in Clements & Clements, Rocky Mt. Flowers, t. 16, fig. 1 (1914) and by McCalla, Wild Fl. W. Can. 37 (1920).—Meadows, bogs and damp places, Mackenzie to Colorado and Utah. MACKENZIE: Great Slave Lake, *Richardson*. SASKATCHEWAN: without locality, 1858, *Bourgeau*; Carlton House, *Richardson*; bank of Saskatchewan R., Prince Albert, *J. Macoun*, no. 12,211 (Can.); borders of marshes, Pleasant Plain, *J. Macoun*, no. 15,837 (Can.); borders of marshes near the South Saskatchewan, *J. Macoun*, no. 15,838 (Can.); Souris Plain, *J. Macoun*, no. 15,830 (Can.); damp thickets along Humber Creek, Moose Jaw, *J. Macoun*, no. 12,742 (Can.); Cypress Hills, *J. Macoun*, no. 5313; Farewell Creek, Cypress Hills, *J. Macoun*, no. 11,776 (Can.). ALBERTA: The Cascade, Athabasca River, *Elizabeth Taylor*, nos. 38, 110; White Mud River, *Spreadborough*, no. 19,852 (Can.); wet spots, Edmonton, *McCalla*, no. 2590 (Can.); grassy banks, Red Deer, *H. H. Gartz*, no. 7476 (Can.); boggy ground, West Fork, Water Coulee, near Rosedale, *Moodie*, no. 942; bank of Bow River, Calgary, *Malte & Watson*, no. 118,331 (Can.); Elbow River, *J. Macoun*, no. 24,528 (Can.); Rocky Mountains, *Burke*; foot of Devil's Lake, *J. Macoun*, no. 101,401 (Can.). MONTANA: Willow Creek, *Scribner*, no. 143; moist meadow, Armstead, Beaverhead Co., *Payson & Payson*, no. 1735; mountain canyons, Anaconda, *Blankinship*, no. 727 (Can.). WYOMING: Little Laramie River, *Nelson*, nos. 1871, 1961; damp soil, Hot Spring Bar, 20 mi. south of Jackson, *Merrill & Wilcox*, no. 1039; wet soil, Adams Ranch, Jacksons Hole, *Merrill & Wilcox*, no. 990; low meadow near North Pilot Butte, *Merrill & Wilcox*, no. 749; meadow 20 mi. west of Big Piney, Sublette Co., *Payson & Payson*, no. 2648. COLORADO: Rocky Mts., lat. 39° 41', 1862, *Hall & Harbour*, no. 378; South Park, *E. L. Hughes*, no. 45; Grape Creek, Custer Co., July 2. 1888, *Demetrio*; Gunnison, *Baker*, no. 361.

Jones's original material was from cold bogs at the head of Sevier River, Utah, I have not seen the type but the description clearly

belongs to the characteristic plant of the Rocky Mountain and Great Plain area. The name *P. dealbata* Engelm. (1863), having been published merely as a synonym, cannot displace the validly published, but later *P. incana* Jones (1895). In its smaller extremes *P. incana* closely simulates *P. stricta*, but when well-developed it is quite distinct in its large and copiously farinose leaves, flat and rather broad bracts, and longer and broader strongly farinose calyx.

In its subcapitate inflorescence and plane bracts *P. incana* is nearer related to *P. decipiens* of southern South America (*P. magellanica* of authors) than to other members of the *Farinosae*. This relationship of the Magellanic and Rocky Mountain plants, long familiar in other groups, was clearly recognized by Asa Gray, who, however, failed to detect the characters which separate the two. In enumerating the Rocky Mountain plants of Hall & Harbour, Gray said:

"378. PRIMULA FARINOSA L., var. foliis sessilibus; umbella capitata; calyce cylindraceo tubum corollae subaequante. *P. dealbata*, Engelm. in litt. But it exactly accords with the left-hand figure of *P. farinosa*, var. *Magellanica* of Hooker's Flora Antarctica (*P. decipiens*, Duby), and with my Antarctic specimens, except that the calyx is perhaps a little longer, and the corolla bluish-purple. . . . It is interesting thus to connect the Antarctic with the northern forms, by specimens from the Rocky Mountains in about lat. 40°."<sup>1</sup>

As stated, Gray overlooked some very real characters: *P. decipiens* (*P. farinosa*, var. *magellanica*) with longer calyx-lobes, the corolla with shorter tube and with much larger white (rarely lilac-tinged) limb (1.2-2 cm. broad) with lobes twice as broad, capsule much longer, and seeds the largest in the section (1 mm. long), rounded-obovoid and conspicuously muricate; but the affinity of *P. incana* is, nevertheless, with *P. decipiens* rather than with *P. farinosa*.

4. *P. DECIPIENS* Duby. *Leaves* spatulate to narrowly ovate, obovate or rhombic, tapering to a sessile base or broad petiole, *serrulate-dentate*, 1-9 cm. long, 0.7-2 cm. broad, *efarinose* or farinose beneath; *scape* 0.3-5 dm. high, *stout*, up to 4 mm. in diameter below the umbel, farinose at summit; *involucral bracts* flat, lanceolate, 6-10 mm. long, broadly gibbous at base; *umbel subcapitate*, few- to many-flowered; pedicels stout, pulverulent, lengthening in fruit to 2-10 mm.; *calyx* urceolate-campanulate, *efarinose* or sparingly farinose, in maturity about 1 cm. long and 5 mm. in diameter; the oblong-lanceolate obtuse to acutish lobes equaling the tube; corolla white or sometimes tinged with lilac; the greenish tube shorter than to barely equaling the calyx;

<sup>1</sup> Gray, Proc. Acad. Nat. Sci. Phila. (1863) 70.

the limb 1.2–2 cm. broad, with obcordate and cuneate-obovate lobes 3.5–6 mm. broad; anthers and stigma not exerted from the yellow throat; capsule ellipsoid or slenderly ovoid, distinctly exceeding the calyx; seeds dark-brown, 1 mm. long, rounded-obovoid, conspicuously muricate.—Mém. Fam. Prim.—Mém. Soc. Phys. d'Hist. Nat. Genève, x. 46, t. ii. fig. 1 (1844); Duby in DC. Prodr. viii. 44 (1844). *P. magellanica* Hook. Fl. Ant. ii. t. cxx. (1847); Skottsberg, Bot. Surv. Falk. Isl.—Kungl. Sv. Vet. Akad. Handl. 1. no. 3: 46 (1913); Skottsb. Vegetationsverhältnisse längs der Cordillera de los Andes.—Bot. Ergebn. Schwed. Exped. Patag. Feuerl. 1907–1909, v. 285 (1916); not Lehm. Mon. Prim. 62, t. vi (1817). *P. farinosa*, var. *magellanica* Hook. Fl. Ant. ii. 337, t. cxx (1847)<sup>1</sup>; Decaisne in Dumont-D'Urville, Voy. au Pole Sud, Bot. ii. 24, t. 31, fig. 5 (1848–53); Franchet, Miss. Scientif. Cap Horn, 1882–1883, v. 354 (1889); Dusén, Svenska Exped. Magellansl. iii. no. 5: 139 (1900); Macloskie, Rep. Princeton Univ. Exped. Patag. 1896–1899, viii<sup>2</sup>. 650 (1905); Pax & Knuth in Engler, Pflanzenr. iv.<sup>237</sup>. 85 (1905); De Wildem. Phan. des Terres Magel. 138 (1905); Reiche, Fl. Chil. v. 93 (1910); Vallentin & Cotton, Ill. Fl. Pl. and Ferns Falk. Isl. t. 41 (1921); not *P. magellanica* Lehm. (1817). *P. farinosa* Gay, Fl. Chil. iv. 367 (1849), not L.—Falkland Islands and from Fuegia northward along the Andes of Chili and Argentina to lat. 38° (acc. to Skottsberg).

There is no doubt as to the application of the name *Primula decipiens*. Duby clearly illustrated the plant and his description explicitly gives the diagnostic characters: “foliis . . . serrulatis . . . , . . . invol. . . . calyces subaequantis foliolis elongato-lanceolato-linearibus . . . , calycis . . . . laciniis . . . . obtusis, cor. . . . lobis late obcordatis . . . . Flores subsessiles etiam in planta fructifera; corollae majores quam in *P. farinosa*.”

Lehmann's *P. magellanica*, to which all subsequent authors except Duby have referred the Falkland and Patagonian plant, differed in many striking characters from the plant with subcapitate white flowers which Duby correctly set off as *P. decipiens*. Lehmann's description called for “Folia . . . dentato-crenata” and his figure of a large plant shows teeth less salient than in large plants of *P. decipiens*. *P. magellanica* had “Involucri foliola . . . unguicularia,” but the bracts of *P. decipiens* are flat and hardly unguiculate. The umbel of *P. magellanica* was described: “Pedicelli . . . unciales . . . Calyx . . . laciniis ovatis, acutis, . . . Corolla . . . carnea: . . . laciniis cuneiformi-

<sup>1</sup> In the text Hooker treats the plant as a variety, but the caption of the plate reads *Primula Magellanica*.



bus"; and the plate accurately coincides with the description, showing flowering pedicels twice as long as the involucre, ovate acute calyx-teeth only half as long as the tube, and narrowly cuneate corolla-lobes only 3-3.5 mm. wide. *P. decipiens*, however, has pedicels nearly obsolete or in fruit only a few millimeters long, the calyx-lobes oblong and obtuse to only subacute and equaling the tube; the white (rarely lilac-tinged) corolla with cuneate-obovate lobes much broader (3.5-6 mm. broad). All authors except Duby have, as said, consistently treated the plant of subantarctic South America as *P. magellanica* or as *P. farinosa*, var. *magellanica* (or sometimes as *P. farinosa*), but either Lehmann's plant did not come from the Straits of Magellan, as he supposed, or else he had a very rare species which has escaped subsequent collectors. It is to be noted that he received the plant indirectly and it is probable that there was some error as to its geographic origin: "Pulchra haecce et nova species Parisiis a Dom. de JUSSIEU absque nomine, sed cum nota: hab. ad fretum Magellanicum, communicata mecum est. In nullo alio herbario eam vidi; neque minus, qui plantam detexerit, cognitum habeo." At any rate, unless *P. decipiens* is far more variable than the six collections before me and the descriptions or plates of such authors as Duby, Hooker, Decaisne, Skottsberg and Vallentin & Cotton indicate, it is wiser not to take up for it the name *P. magellanica* Lehm.

The occurrence of *P. decipiens* in southern South America, separated by about 78 degrees of latitude from its nearest ally in Colorado and Utah, has naturally attracted comment. Thus Hooker, failing to note the characters of the involucre and the very distinct seeds and consequently reducing the plant to varietal rank under *P. farinosa*, said: "One argument which militates against the common origin of the individuals from the opposite hemispheres, must not be overlooked; it is the absence of the plant, and, indeed, of the whole genus, in any part of the Andes [i. e. the Cordillera] south of 39° north lat.; a circumstance which makes it very difficult to account for its appearance in the two opposite temperate zones, if all the individuals of both hemispheres are supposed to have sprung from one parent."<sup>1</sup> Gray's comment in 1863, when he identified the Great Plain and Rocky Mountain plant with the Magellanic, has been quoted in the discussion of *P. incana*. Franchet (1889) and Macloskie (1905)

<sup>1</sup> Hook. Fl. Ant. ii. 337 (1847).

have reiterated the fact, but have added nothing to its interpretation. It is at least noteworthy that the Magellanic plant is closest related apparently, to *P. incana* of the northern Cordillera and Great Plains (Utah and Colorado north to Mackenzie) and that the smallest extremes of the latter are separated only with difficulty from the circumpolar arctic and subarctic *P. stricta*. In eastern North America, dwarf extremes of *P. laurentiana*, superficially so strongly resemble *P. incana* that they have been mistaken for it, and in its farinose form *P. laurentiana* is separated from the arctic *P. stricta* only with difficulty. Similarly, *P. farinosa* of temperate Eurasia is often difficult to distinguish from *P. stricta* and under their treatment of the latter species Pax & Knuth specially say: "Species haec valde affinis *Pr. farinosae* et forsitan melius pro ejus varietate habenda." From this line of evidence it may well be that the arctic *P. stricta* is the progenitor from which have been derived *P. farinosa* and other species of Eurasia, *P. laurentiana* of the Gulf of St. Lawrence region, *P. intercedens* of the upper Great Lakes, *P. incana* of the North American cordillera and still farther isolated, *P. decipiens* of the southern American cordillera.<sup>1</sup>

(To be continued.)

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## SOME ILLINOIS ASTERS AND A NEW VARIETY OF *A. MULTIFLORUS*.

H. C. BENKE.

IN September and October of 1927 the writer made a trip from Chicago to southern Illinois and adjacent Missouri, making numerous stops for collecting, with the genus *Aster* under particular observation. Among many specimens obtained the following seem worth recording.

Specimens of *Aster furcatus* Burgess, secured at Crystal Lake, McHenry County, on Sept. 15th (Benke 4366) were found to be with-

<sup>1</sup> Similar lines of descent from living arctic species have been suggested in Fernald, *Persistence of Plants in Unglaciaded Areas of Boreal America*, Mem. Am. Acad. xv. 334 (1925); and numerous arctic species besides *Primula stricta*, with endemic representatives along the North American cordillera or about the Gulf of St. Lawrence, have their isolated Magellanic or Falkland ally or allies; in such genera as *Puccinellia*, *Draba*, *Saxifraga*, *Empetrum*, *Euphrasia*, *Antennaria*, *Agoseris*, *Taraxacum*, etc.; while others, like *Carex incurva*, *C. Macloviana*, *Plantago juncoideis*, etc., show little, if any, differentiation.

out the usual leaf-lacinations. The region furnished no other specimens of this form.

In the region about Peoria, *Aster Shortii* Lindl., usually in Illinois occurring locally and in small colonies only, became the commonest species—the woods being literally filled with it (*Benke 4371*).

Further on, in the Bushnell-Quincy region, it was noted that *Aster novae-angliae* L., var. *roseus* (Desf.) DC. (*Benke 4372*) was about as common as the usual purple-blue color-form of the species and *Aster salicifolius* Ait. (*Benke 4364*), rare upstate, became very luxuriant and plentiful.

Along the railroad track to the north of Bushnell the well-known *Aster multiflorus* Ait. with bright white rays was found in profusion. Beyond the first mile out of town and to the west of the track my attention was attracted by a small colony of very decidedly blue Asters. These also proved to be *Aster multiflorus* Ait., but with rays blue, or rather blue with a suggestion of purple. The plants, too, were rather more strict, with branches ascending, making them appear somewhat taller than the neighboring white-rayed ones. It was especially noteworthy that the pappus was white as in *Aster ericoides* L., and not tawny colored as is so characteristic of *Aster multiflorus* Ait., but otherwise the plants were not to be distinguished from the latter. The bracts were entirely characteristic of *multiflorus*. About a quarter mile further north I came upon a second and larger colony of several square yards extent. No other colonies were observed in the region, though the territory was travelled in several directions for a number of miles out of the city. Of thousands of the plants of this species through many miles and through many years' observation in the field, these were the first specimens noted that did not have the typical white rays or at most the merest suggestion of color, so at once they were very striking to me. Certainly they formed a conspicuous bit of color in the landscape. For these reasons I feel justified in proposing this variation as

ASTER MULTIFLORUS Ait., var. *caeruleus*, var. nov. Caule stricto; ramis valde adscendentibus; foliis non confertis acutis; ligulis definite caeruleis vel aliquid purpureo-caeruleis; pappo albo.

With the species, but rather more strict, with branches strongly ascending; cauline and rameal leaves acute, not crowded; rays definitely blue, tending slightly to purplish; pappus white. The type is *H. C. Benke 4373*, Sept. 29, 1927, in Field Museum of Natural



History, Chicago, Illinois. The color of the rays is best described by my field note as blue with a very slight suggestion of purplish. Specimens of *Aster multiflorus* Ait. looked over in Field Museum Herbarium show an occasional tendency to purplish or roseate ligules but none to the blue of this specimen.

Further south, in the triple valley of the Illinois, Mississippi and Missouri Rivers, lies the city of Jerseyville, at the east edge of which, on uncultivated land, I came upon a couple of small colonies—one a mere clump of plants—of *Aster tataricus* L. f. (Benke 4536, ex descr.). The region being an old-settled one, it is probable that the species was cultivated a long time back and has persisted. The only published record found for the occurrence in America of this Old World Aster is for New York City, Mem. N. Y. Bot. Gard. 5: 615. (1915).

During the entire trip *Aster ericoides* L., var. *villosus* T. & G. was the single species constantly and abundantly present, for example, Benke 4362, Jerseyville.

CHICAGO, ILLINOIS.

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VICTORIN'S LES ÉQUISÉTINÉES DU QUÉBEC.—Brother Victorin has followed his detailed studies of the Ferns and the Lycopods of Quebec by a similar elaborate study<sup>1</sup> of the genus *Equisetum*. Covering a region along our northern border, the treatment must be of the greatest interest to students of the New England flora. Like its predecessors in the series this number gives with remarkable detail the histories of treatments of the species and a very full consideration of the more striking variations. The work seems refreshingly sane and the recent proposition to recognize two genera, *Equisetum* and *Hippochaete*, is well met. The revisions which will be of interest to New England botanists are the following. Typical *Equisetum arvense*, with the branches 4-angled and their sheaths 4-toothed, is found to be comparatively southern, the extreme northern plant (Greenland, Labrador and Quebec, and doubtless northern New England), with the branches 3-angled and their sheaths 3-toothed, being var. *boreale* (Bong.) Rupr. Numerous minor forms are recognized under each. Typical *E. palustre* is believed not to occur in America; our plant, distinguished by the sheaths having sharper teeth with narrower white margins, being var. *americanum* Vict. In *E. littorale* several forms are recognized and, as under the other species, beautifully illustrated. *E. limosum* is accorded five vegetative forms besides the typical one, forma *natans* Vict. being new. *E. hyemale* is retained, with the

<sup>1</sup> MARIE-VICTORIN. Les Équisétinées du Québec. Contrib. Lab. Bot. de l'Univ. de Montréal, No. 9. 137 pp. and numerous illustrations. 1927.

American varieties *affine* and *Jesupi* (*E. variegatum*, var. *Jesupi* A. A. Eaton) and several forms are accorded each variety (Eaton's vars. *pumilum* and *intermedium* treated as minor forms of var. *affine*). *E. variegatum*, now without its traditional var. *Jesupi*, is accorded the single var. *anceps* Milde; while *E. scirpoides* is found to be too stable for the segregation of named forms. Space does not permit fuller discussion of the most thorough study of *Equisetum* which has yet appeared in America; but it is needless to say that l'Université de Montréal will receive many requests for copies of this most helpful revision. Not least interesting, from a personal standpoint, is an excellent portrait (fig. 12) of Bro. Victorin in field-costume, displaying the full length of a rootstock of *E. palustre*, var. *americanum*.—M. L. F.

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PRIMULA LAURENTIANA  $\times \frac{3}{4}$







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